MICRON

Ceramic Insulated Resistors Fusible Resistors

ROBERT G. ALLEN COMPANY, INC.
CAPACITORS & RESISTORS

7267 Coldwater Canyon, North Hollywood, CA 91605 (818) 765-8300 Los Angeles
(714) 549-4316 Orange County—(408) 243-7007 Bay Area
(800) 423-3186 Outside of California—FAX (818) 765-2387

Cement resistors are the fail-safe resistors exclusively developed for use in TVs and various other electronic appliances. Thanks to their excellent structure and outstanding productivity, they are widely used as power resistors. At present they are also highly praised in the fields of auto-related appliances and industrial equipment. In particular, we are confident that our own quality control systems and manufacturing techniques are sufficiently top-grade to offer high reliability and a variety of resistors types.

■ Features

1. Wide resistance range:
   Using wire-wound, metal oxide film, and thick film resistor elements, a very wide range of resistances can be covered.
2. Small size and large capacity:
   Though the resistors are designed to be compact, their durability is high against rigorous loading.
3. High safety:
   Since they are composed of uniquely developed non-flammable materials, safety is outstanding against overloading.
4. Superb electrical characteristics:
   Using carefully selected materials and based on MICRON's many years of manufacturing experience, stable characteristics are maintained.
5. Surge withstand characteristics:
   Surge limiting resistors are designed to meet users' requirements, based on accumulated know-how.
6. Wide application range:
   Various arrangements are being made to expand the application range and meet users' needs.
7. Specifications for special applications:
   Special specifications are also available, such as non-inductive wire-wound type (AP), solvent-proof type (CL), UL-specifications type, detection-purpose low resistance type, etc.

■ Standard characteristics and performance (Example for MSS) and performance (Example for MS

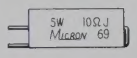
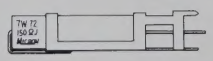
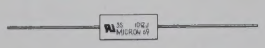
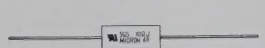
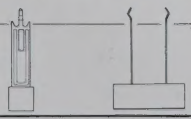
	Characteristics	MICRON Standards		Actual performance (Average values detected)	EIAJ-RC2649 Standards
		Test method	Guarantees		
Mechanical performance	Terminal strength	Pulled at 4.5kg	Durable		——
	Terminal soldering property	Dipped at 230℃ for 5 sec.	90%min.	More than 95% of the area covered with new solder	
	Soldering heat durability	350℃ for 3 sec.	±2%	Within 0.5%	±(1%+0.05Ω)
	Resistor strength	10kg for 10sec.	Durable		——
	Vibration durability	10-55-10Hz/min. 1.5mm in3 directions for 6 hours in total	±1%	Within 0.5%	±(1%+0.05Ω)
Electrical performance	Withstand voltage	1000V applied for 1min.	±0.5%	Within 0.1%	±(0.5%+0.05Ω)
	Insulation resistance	500V megger	20MΩ or more	100MΩ or more	100MΩ or more
	Rated load characteristic	Rated voltage for 30min.	±2%	Within 0.7%	——
	Short-time overload characteristic	Rated power×10/5sec	±2%	Within 0.5%	±(2%+0.05Ω)
	Resistance temperature characteristic	−25℃～155℃	400PPM/deg	Within 200PPM/deg.	±250PPM/℃
Weather-proof performance	Moisture load life characteristic	40℃・90～95% Rated power	±3%	Within 0.5%	±(3%+0.05Ω)
	Moisture resistance	DC.100V 500Hr	5MΩ or more	Within 0.5%、50MΩ or more	——
	Load life	1.5Hr・ON・0.5Hr・OFF Rated power	±5%	Within 3%	±(5%+0.05Ω)
	Heat resistance	275℃・2Hr	No abnormality		——
	Thermal shock	Rated power 30 min.→ −25℃ for 15 min	±3%	Within 0.8%	±(2%+0.05Ω)

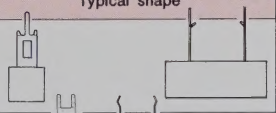
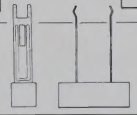
Rated power and ambient temperature

	TYPE MSS		TYPE RW-98 (EIAI RC-2649)	
	Rated power	Ambient temperature	Rated power	Ambient temperature
02	2	70	2	70
03	3		3	
05	5		5	
07	7		7	
10	10		10	
15	15	25	12	
20	20		—	—

Cement Resistor Applications (Example)

Fields	Mounting	Board type										Chassis type							
	Type	MN	MD	MV	MS	MG	MX	MP MQ	MZ	FR	ME	MH	MF	MC	MB	MY	MR	ML	MO
	Page	P 4 P 5	P 5	P 5	P 6	P 6	P 6	P 7	P 7	P 10	P 11	P 8	P 9	P 9	P 12	P 13	P 14	P 15	P 16
Consumer appliances	Color T.V	◎		◎	○		◎	◎	◎	◎	◎	◎							
	VCR	◎						◎		◎									
	Audio	◎	○		○			◎		◎									
OA equipment	Displays	◎	○	◎	○		◎	◎	◎	◎	◎	◎							
	Printers	◎	○		○	○		◎			○								
	Facsimile	○	○		○			◎											
	Copiers	○		○	○			◎		○		◎							
Industrial equipment	Switching sources	◎	◎	○	◎	○	◎	◎	◎	○	◎		◎						
	General inverters	◎			◎	○		◎			○	◎	◎	○	◎	◎	◎	◎	◎
	NC, servo amplifiers	○			○	○		◎		○	○	◎	○	○	◎	◎	◎	◎	◎
	Industrial robots	○			○	○		◎			○	◎	○	○	◎	◎	◎	◎	◎
	Welders				○	○		◎			○	◎	○	○	◎	◎	◎	◎	◎
Auto-related appliances	General	○	○		◎			◎			○	◎	○	○					
Miscellaneous	Kerosene fan heaters	◎			○			◎				◎	○						
	Gas hot-water supplies	○						○					○						
	Microwave ovens											○	○						
	Radio-controlled cars				○														

Type	Page	Typical shape
MN	4 5	
MD	5	
MV	5	
MS	6	
MG	6	
MX	6	

Type	Page	Typical shape
MP MQ	7	
MZ	7	
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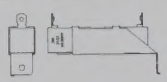
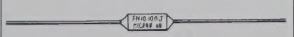
MF	9	
MC	9	
FR	10	

Type	Page	Typical shape
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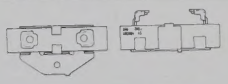
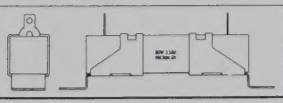
MB	12	
MY	13	
MR	14	
ML	15	
MO	16	

■ Type descriptions

MN	S	05	N	100	J	C
Type	Element	Rated power	Mounting metal fitting	Nominal resistance	Tolerance for resistance	Standard spec.

Type
- MP - Pin terminal
- MH - Lug terminal
- MN - Vertical lead terminal

Element
- G - wire-wound type (ceramic core)
- S - Wire-wound type (glass fiber core)
- R - Metal oxide film

Rated power
- 02 - 2W
- 10 - 10W
- 15 - 15W

Mounting metal fitting
- N - Nil
- A - Horizontal
- B - Vertical

Nominal resistance
The first two digits are for an effective value and the third digit denotes the number of zeros following the former. The decimal point is indicated by "R."
[例] Example
- 0.05Ω = 50M
- 0.5Ω = R50
- 100Ω = 101
- 2KΩ = 202

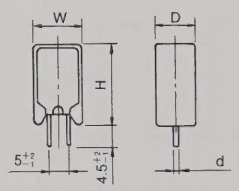
Tolerance for resistance
- F - ±1%
- G - ±2%
- H - ±3%
- J - ±5%
- K - ±10%

Standard spec.
- C - Solvent-proof
- U - UL-spec.
- I - General
- W - Non-inductive and solvent-proof
- N - Non-inductive

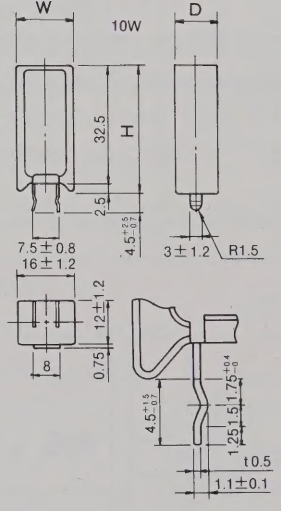
MNS
MNR
MNG

Terminals and leads in the same direction; space-saving types

2W～7W

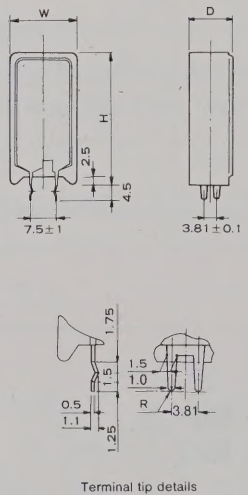


10W



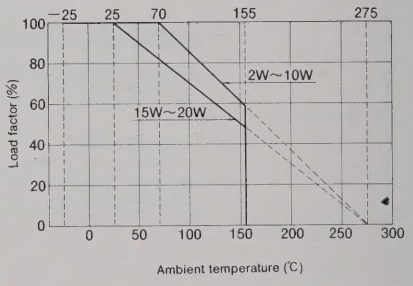
Terminal tip details

15W ～ 20W

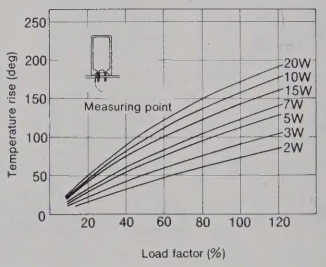


Terminal tip details

Derating curve



Temperature rise (ref.)



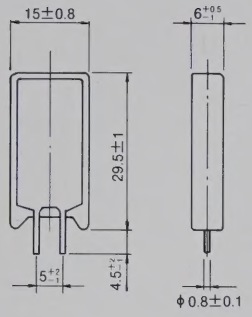
Rated power (W)	Dimensions (mm) W	D	H	d	Resistance range MNS Standard	MNS UL	MNR Standard	MNR UL	MNG Standard	Weight (g)
2	11±1	7±1	20.5±1.5	0.8±0.1	0.15～200	0.15～200	100～13K	100～13K	0.082～33	3.7
3	12±1	8±1	25.0±1.5	0.8±0.1	0.27～360	0.27～360	100～22K	100～22K	0.18～68	5.3
5	13±1	9±1	25.5±1.5	0.8±0.1	0.3～510	0.3～510	100～27K	100～27K	0.22～91	6.4
7	13±1	9±1	38.5±1.5	1.0±0.1	0.51～1.5K	—	200～56K	—	—	10.2
10	16±1	12±1	35.0±1.5	—	1.0～1K	—	—	—	—	15.5
15	20±1.2	13±1	38.0±1.5	—	1.0～2.0K	—	—	—	—	30.0
20	20±1.2	13±1	45.0±1.5	—	1.0～3.0K	—	—	—	—	41.0

※Stick type also available.

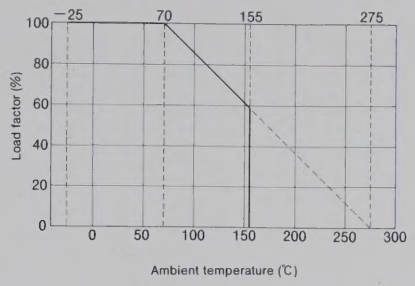
※Resistance deviating from the specified range is also acceptable (Custom-order specification)

MNM

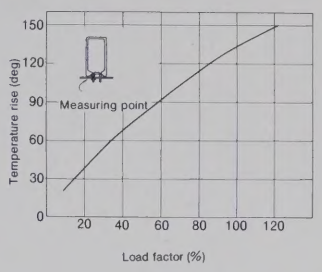
Space-saving thin type



Derating curve



Temperature rise (ref.)



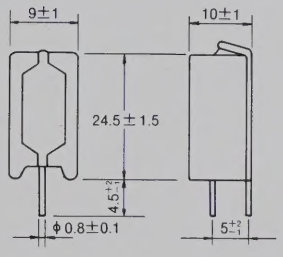
Rated power, resistance range, and tolerance

Type	Rated power	Nominal resistance
05	5W	1Ω～20MΩ

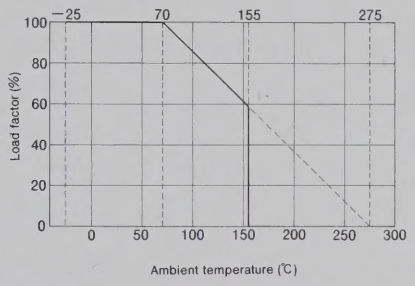
※The wire-wound type is used for 1Ω～43Ω, and the film type is for 47Ω or more.

MDS
MDR
MDG

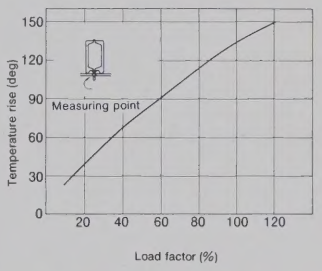
PCB area saving types



Derating curve



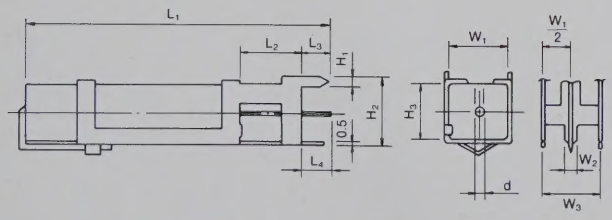
Temperature rise curve



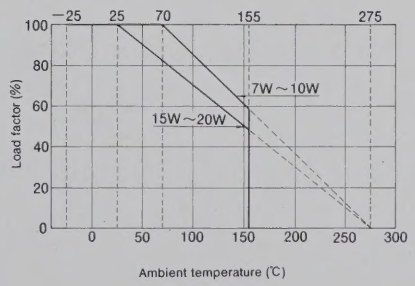
Rated power (W)	Resistance range			Weight (g)
	MDS	MDR	MDG	
5	0.3～510	100～27K	0.22～91	6.0

MVS
MVR

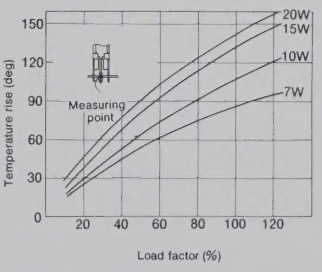
Designed for minimal PCB occupation area and heat conduction



Derating curve



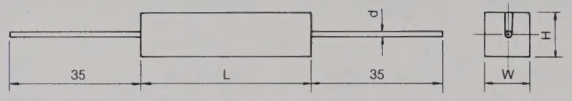
Temperature rise (ref.)



Rated power (W)	Dimensions (mm)											Resistance range		Weight
	L1	L2	L3	L4	H1	H2	H2	W1	W2	W3	d±0.1	MVS	MVR	
7	49 ±1.5	10±1	4.0±0.2	5.0±0.5	1.5±0.1	11±1	9 ±1	9.5±1	1.5±0.1	10±1	0.8	0.51～1500	200～56K	10.0
10	67 ±1.5	10±1	4.0±0.2	5.0±0.5	1.5±0.1	11±1	9 ±1	9.5±1	1.5±0.1	10±1	0.8	1 ～2000	200～75K	13.3
15	62.5±1.5	10±1	4.5±0.2	6.5±1	2.5±0.15	14±1	12.5±1.2	12.5±1.2	2.5±0.15	13±1	1.0	1 ～2000	510～110K	22.1
20	78 ±2	10±1	4.5±0.2	6.5±1	2.5±0.15	14±1	12.5±1.2	12.5±1.2	2.5±0.15	13±1	1.0	1 ～3000	510～180K	26.4

MSS
MSR
MSG

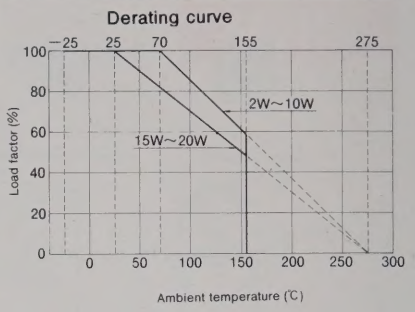
Multi-type, basic for cement resistors



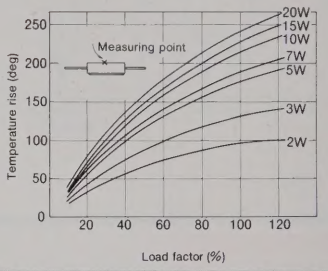
(MSS Standard Spec. EIAJ RC-2649)

Rated power (W)	Dimensions (mm)				Resistance range					Weight (g)
	L	W	H	d±0.1	MSS		MSR		MSG	
					Standard	UL	Standard	UL	Standard	
2	17.5±1.2	6.4±1	6.4±1	0.80	0.15～200	0.15～200	100～13K	22 ～13K	0.082～33	2.1
3	22 ±1.5	8.0±1	8.0±1	0.80	0.24～360	0.75～350	100～22K	33 ～22K	0.18～68	3.8
5	22 ±1.5	9.5±1	9.0±1	0.80	0.3～510	0.3～500	100～27K	33 ～27K	0.22～91	5.1
7	35 ±1.5	9.5±1	9.0±1	0.80	0.51～1.5K	0.5～1.4K	200～56K	5.6K～56K	——	7.7
10	48 ±1.5	9.5±1	9.0±1	0.80	1.0～2K	1.0～2K	200～75K	5.6K～75K	——	10.8
15	48 ±1.5	12.5±1.2	12.5±1.2	1.00	1.0～2K	1.0～2K	510～110K	150～110K	——	18.3
20	63.5±2.0	12.5±1.2	12.5±1.2	1.00	1.0～3K	1.0～3K	510～180K	10K～180K	——	22.4

Derating curve

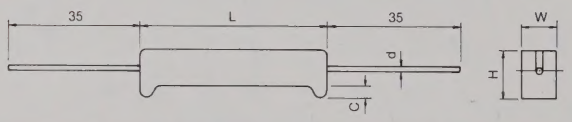


Temperature rise (ref.)



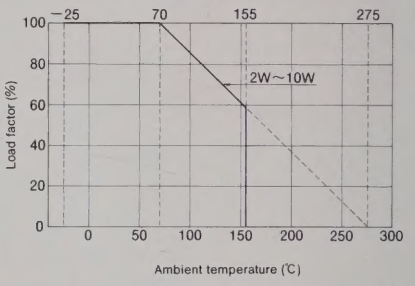
MGS
MGR
MGG

Types for reducing heat conduction to PCB

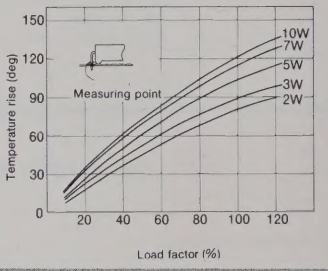


Rated power (W)	Dimensions (mm)					Resistance range					Weight (g)
	L	W	H	C	d±0.1	MGS		MGR		MGG	
						standard	UL	Standard	UL	Standard	
2	17.5±1.2	6.4±1	7.9±1	1.5	0.80	0.15～200	0.15～200	100～13K	22 ～13K	0.082～33	2.3
3	22 ±1.5	8.0±1	9.3±1	1.5	0.80	0.24～360	0.25～350	100～22K	23 ～22K	0.18 ～68	3.9
5	22 ±1.5	9.5±1	11.9±1	1.5	0.80	0.3 ～510	0.3～500	100～27K	33 ～27K	0.22～91	5.4
7	35 ±1.5	9.5±1	12.5±1.2	3	0.80	0.51～1.5K	0.5～1.4K	200～56K	5.6K～56K	——	8.2
10	48 ±1.5	9.5±1	12.5±1.2	3	0.80	1.0～2K	1.0～2K	200～75K	5.6K～75K	——	11.0

Derating curve

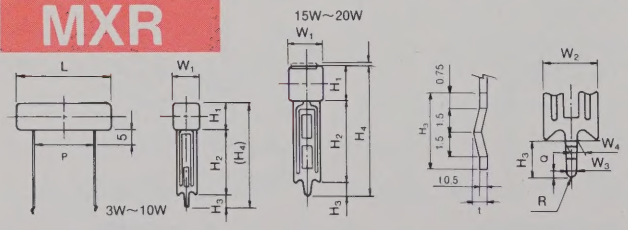


Temperature rise (ref.)

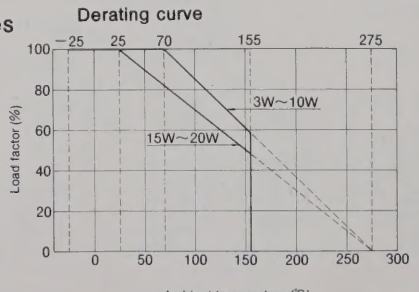


MXS
MXR

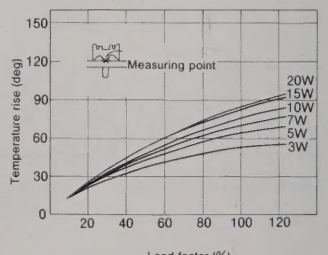
PCB direct-mounting high-load types



Derating curve



Temperature rise (ref.)



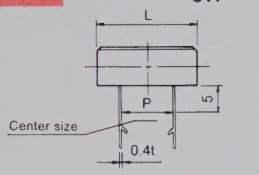
Rated power (W)	Dimensions (mm)												Resistance range		Weight (g)
	L	P	W_1	W_2	W_3	W_4	Q	H_1	H_2	H_3	H_4	t	MXS	MXR	
3	24 ±1.2	12.5±1	9 ±0.1	7	1.4±0.1	1.6±0.1	0.7	9 ±1	25±2	4.5	38.5	0.85±0.1	0.22～390	100～39K	6
5	27 ±1.5	15 ±1	9.5±1	7	1.4±0.1	1.6±0.1	0.7	9.5±1	25±2	4.5	39	0.85±0.1	0.47～680	100～51K	7.2
7	35 ±1.5	22.5±1	9.5±1	7	1.4±0.1	1.6±0.1	0.7	9.5±1	25±2	4.5	39	0.85±0.1	0.68～1000	200～100K	9
10	48 ±1.5	35 ±1	9.5±1	7	1.4±0.1	1.6±0.1	0.7	9.5±1	25±2	4.5	39	0.85±0.1	1.0 ～1500	200～150K	11.5
15	48 ±1.5	32.5±1	12.5±1.2	10	2.7±0.1	3 ±0.1	1.35	17.5±1.2	30±2	5	47.5	1.1±0.1	1.0 ～2000	——	18.2
20	63.5±2	50 ±1.2	12.5±1.2	10	2.7±0.1	3 ±0.1	1.35	17.5±1.7	30±2	5	47.5	1.1±0.1	1.0 ～3000	——	23.9

MPS
MPR
MQS
MQR

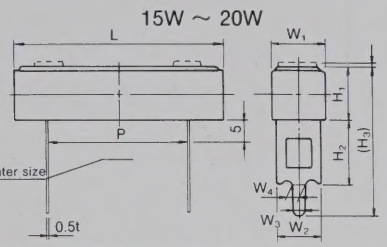
PCB direct-mounting types

Types using lower heat conductive terminal (approx. 50% of MPS, MPR)

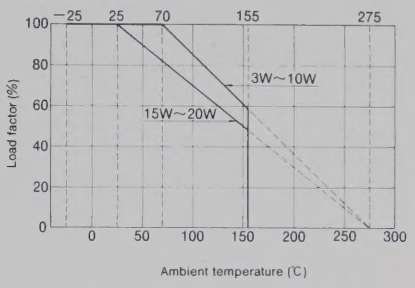
3W ~ 10W



15W ~ 20W

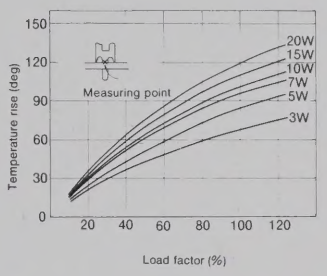


Derating curve



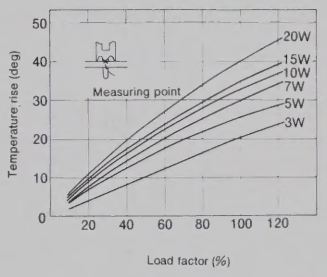
Rated power (W)	Dimensions (mm)								
	L	P	W_1	W_2	W_3	W_4	H_1	H_2	(H_3)
3	24 ±1.2	12.5±1	9 ±1	5±0.2	1.4±0.1	1.6±0.1	9 ±1	10^{+2}_{-1}	23.5
5	27 ±1.5	15 ±1	9.5±1	5±0.2	1.4±0.1	1.6±0.1	99.5±1	10^{+2}_{-1}	24
7	35 ±1.5	22.5±1	9.5±1	5±0.2	1.4±0.1	1.6±0.1	9.5±1	10^{+2}_{-1}	24
10	48 ±1.5	35 ±1	9.5±1	5±0.2	1.4±0.1	1.6±0.1	9.5±1	10^{+2}_{-1}	24
15	48 ±1.5	32.5±1	12.5±1.2	10±0.5	2.7±0.1	3 ±0.1	12.5±1.2	15±1.5	34.5
20	63.5±2	50 ±1.5	12.5±1.2	10±0.5	2.7±0.1	3 ±0.1	12.5±1.2	15±1.5	34.5

Temperature rise (ref.) MPS, MPR



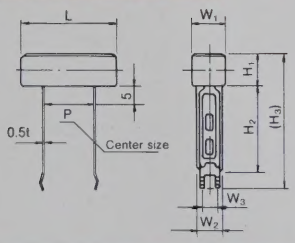
Rated power (W)	Resistance range						Weight (g)
	MPS		MPR		MQS	MQR	
	Standard	UL	Standard	UL	Standard	Standard	
3	0.22~390		100~ 39K	100~ 22K	0.22~ 390	100~ 22K	5.5
5	0.47~ 680	0.47~ 680	100~ 11K	100~27K	0.47~ 680	100~ 27K	6.5
7	0.68~1000	0.68~1000	200~100K	200~ 56K	0.68~1000	200~ 56K	8.3
10	1.0 ~1500	1.0 ~1000	200~150K	200~ 75K	1.0 ~1500	200~ 75K	11.0
15	1.0 ~2000	1.0 ~2000	510~200K	510~110K	1.0 ~2000	510~110K	17.8
20	1.0 ~3000	1.0 ~3000	510~240K	510~180K	1.0 ~3000	510~180K	22.8

Temperature rise (ref.) MQS, MQR

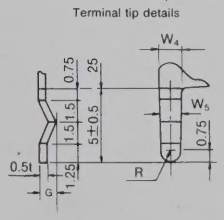


MZS
MZR

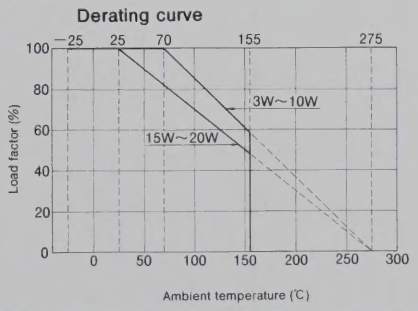
PCB direct-mounting high-load types



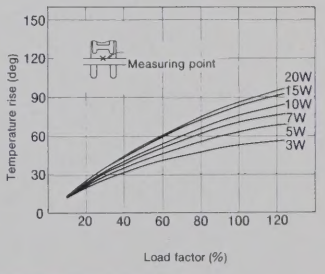
Terminal tip details



Derating curve



Temperature rise (ref.)

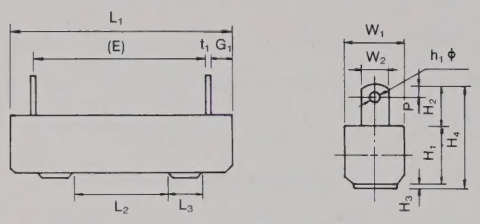


Rated power (W)	Dimensions (mm)												Resistance range		Weight (g)
	L	P	W_1	W_2	W_3	W_4	W_5	H_1	H_2	(H_3)	H_4	G	MZS	MZR	
3	24 ±1.2	12.5±1	9 ±1	6.5±0.4	5±0.4	1.5±0.1	1.5±0.1	9 ±1	25^{+2}_{-1}	39	5±0.5	1.14±0.1	0.22~ 390	100~39K	6
5	27 ±1.5	15 ±1	9.5±1	6.5±0.4	5±0.4	1.5±0.1	1.5±0.1	9.5±1	25^{+2}_{-1}	39.5	5±0.5	1.14±0.1	0.47~ 680	100~51K	7.2
7	35 ±1.5	22.5±1	9.5±1	6.5±0.4	5±0.4	1.5±0.1	1.5±0.1	9.5±1	25^{+2}_{-1}	39.5	5±0.5	1.14±0.1	0.68~1000	200~100K	99
10	48 ±1.5	35 ±1	9.5±1	6.5±0.4	5±0.4	1.5±0.1	1.5±0.1	9.5±1	25^{+2}_{-1}	39.5	5±0.5	1.14±0.1	1.0 ~1500	200~150K	11.5
15	48 ±1.5	32.5±1	12.5±1.2	10±0.4	5±0.4	2 ±0.1	1.5±0.1	12.5±1.2	30^{+2}_{-1}	47.5	5±0.5	1.14±0.1	1.0 ~2000	——	18.2
20	63.5±2	50 ±1.5	12.5±1.2	10±0.4	5±0.4	2 ±0.1	1.5±0.1	12.5±1.2	30^{+2}_{-1}	47.5	5±0.5	1.14±0.1	1.0 ~3000	——	23.9

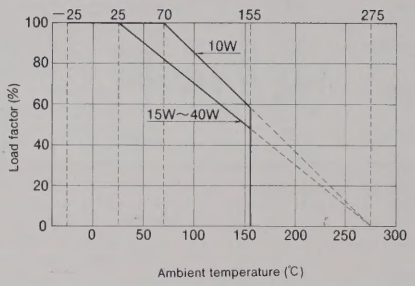
MHS
MHR

Chassis-fixed heat dissipation (efficient) types

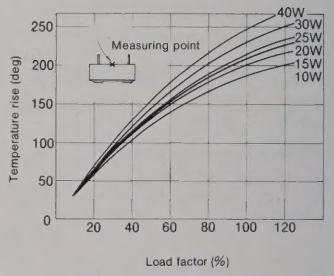
● Type N



Derating curve

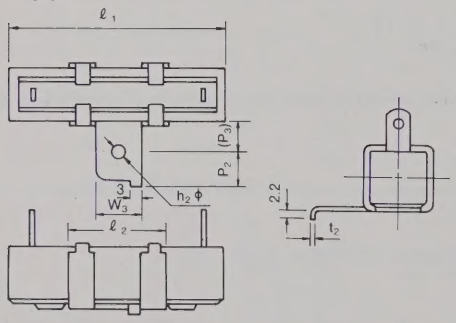


Temperature rise (ref.)



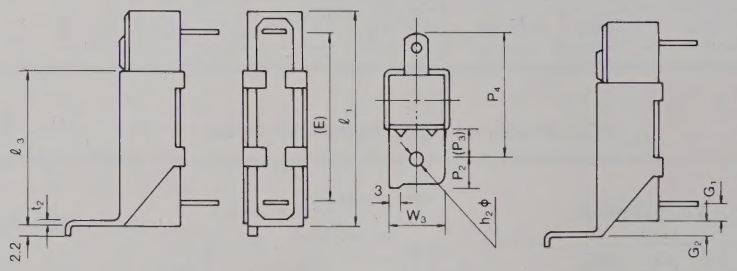
Rated power (W)	Dimensions (mm)													
	L_1	L_2	L_3	W_1	W_2	H_1	H_2	H_3	H_4	P_1	(E)	G_1	t_1	$h_1\phi$
10	48 ±1.5	25±1	4.5	9.5±1.0	5	9.5±1.0	6 +1.5	0.8	$16.5^{+1.5}_{-1.0}$	2.5	36	5.5^{+2}_{-1}	0.4	2
15	48 ±1.5	25±1	7	12.5±1.2	6	12.5±1.2	7.5+2	1.0	$21^{+2.0}_{-1.0}$	3	34	6.5^{+2}_{-1}	0.5	2.5
20	63.5±2	25±1	7	12.5±1.2	6	12.5±1.2	7.5+2	1.0	$21^{+2.0}_{-1.0}$	3	49.5	6.5^{+2}_{-1}	0.5	2.5
25	63.5±2	25±1	8	16 ±1.2	7.5	16 ±1.2	12 +2	1.0	$29^{+2.5}_{-1.5}$	3.5	46.5	$8^{+2.5}_{-1}$	0.5	3
30	75 ±2.5	40±1.2	10	19 ±1.5	7.5	19 ±1.5	10 +2	1.0	$30^{+2.5}_{-1.5}$	3.5	56	9^{+3}_{-1}	0.5	3
40	90 ±2.5	40±1.2	10	19 ±1.5	7.5	19 ±1.5	10 +2	1.0	$30^{+2.5}_{-1.5}$	3.5	71	9^{+3}_{-1}	0.5	3

● Type A



● Type B (10W, 20W, 25W, 40W)

(15W, 30W)



Rated power (W)		Dimensions (mm)											Resistance range			Weight (g)
		ℓ_1	ℓ_2	ℓ_3	W_3	P_2	(P_3)	P_4	G_1	G_2	t_2	$h_2\phi$	MHS Standard	MHS UL	MHR Standard	
10	A	48 ±1.5	24	—	12±0.2	6	8	—	5.5^{+2}_{-1}	—	0.6	4	1.0~1500	1.0~1500	200~ 75K	14.5
	B		—	36				24.5−1~+2			0.6					15.7
15	A	48 ±1.5	24	—	12±0.2	6	8	—	6.5^{+2}_{-1}	—	0.8	4	1.0~2000	1.0~2000	510~110K	24.0
	B	56 ±2	—	43				28−1~+2.5		8±2	0.6					29.0
20	A	63.5±2	24	—	12±0.2	6	8	—	6.5^{+2}_{-1}	—	0.8	4	1.0~3000	1.0~3000	510~180K	28.4
	B		—	43				28−1~+2.5			0.6					29.0
25	A	63.5±2	24	—	12±0.2	6	10	—	$8^{+2.5}_{-1}$	—	0.8	4.2	1.2~3600	1.2~3600	—	44.0
	B		—	43				38−1.5~+3			0.8					53.4
30	A	75 ±2.5	39	—	18±0.2	8	10	—	9^{+3}_{-1}	—	0.8	4.2	1.5~4300	1.5~4000	—	74.0
	B	82.5±2.5	—	64				39−1.5~+3		7.5±2	0.8					82.5
40	A	90 ±2.5	39	—	18±0.2	8	10	—	9^{+3}_{-1}	—	0.8	4.2	1.8~5600	1.8~5500	—	86.5
	B		—	64				39−1.5~+3			0.8					94.0

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1/4w,1/2w,1w,2w,3w,5w
Metal Plate
2w,5w
Precision Wirewound
Tol. to .005%
Temp. Coeficiant to 1PPM
Wirewounds
1w to 1000 watts
Chip Resistors
1/8w,1/4w,1/2w,1w,2w
Variable Resistors
UL, CSA Approved

Networks

Sips
Dips
Custom Type
Hybrid Circuits
Flameproof

Miscellaneous

Switches
LED's
Sockets
Plugs
Lamps
Diodes
Transistors
IC's

Inductors

Choke Coils
Pot Core Coils
Ring Core Coils
Suppression Coils
Suppressor Coils

Capacitors

Electrolytics
General Purpose
Low Leakage
Subminature
High Voltage
Low ESR
Snap in Terminals
High Temperature
Chip
Ceramics
Chip
Hi-K Type
NPO, X7R
Semiconductive Type
Monolythic

Capacitors

Film
Polyester (Mylar)
Metalized Polyester
Polystyrene
Polypropylene
Polycarbonate
Polysulfonate
UL, CSA, VDE Approved
Chip
Tantalum
Dipped Type
Molded Types
Solid
Wet Slug
Chip

Others

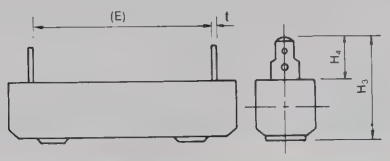
Trimmer
Mica
Varistors

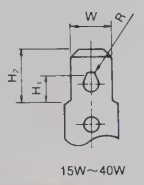
Robert G. Allen Co., Inc.

MFS

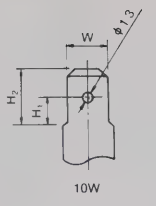
Receptacle-terminal type

● Type N





15W～40W



10W

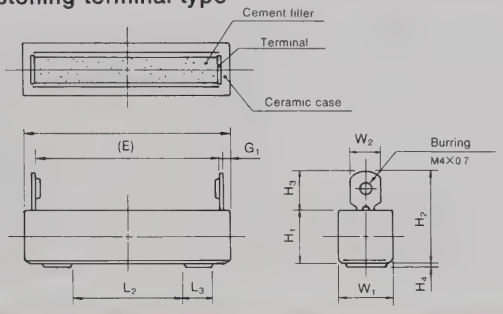
Rated power (W)	Dimensions (mm)								Resistance range		Weight (g)
	H1	H2	H3	H4	W	R	t	(E)	MFS		
									Standard	UL	
10	3.2±0.1	6.35±0.1	20.8^{+2}_{-1}	10 +1.5	4.75±0.1	φ1.3	0.5±0.2	36	1 ～1500	1 ～1500	13.5
15	3.2±0.1	6.35±0.1	25.5^{+2}_{-1}	12 +2	4.75±0.1	0.65±0.2	0.5±0.2	34	1 ～2000	1 ～2000	17.8
20	3.2±0.1	6.35±0.1	25.5^{+2}_{-1}	12 +2	4.75±0.1	0.65±0.2	0.5±0.2	49.5	1 ～3000	1 ～3000	22.0
25	4 ±0.1	7.95±0.1	$34^{+3}_{-1.5}$	17 +2	6.35±0.1	0.825±0.2	0.8±0.2	46	1.2～3600	1.2～3500	36.4
30	4 ±0.1	7.95±0.1	$35.5^{+3}_{-1.5}$	15.5+2	6.35±0.1	0.825±0.2	0.8±0.2	55.5	1.5～4000	1.5～4000	60.0
40	4 ±0.1	7.95±0.1	$35.5^{+3}_{-1.5}$	15.0+2	6.35±0.1	0.825±0.2	0.8±0.2	70.5	1.8～5000	1.8～5000	71.5

※Terminals for 10W・15W・20W fit the Series 187, and those for 25W to 40W fit the Series 250.

※ Other specifications and dimensional conditions are equivalent to those for the MHS.

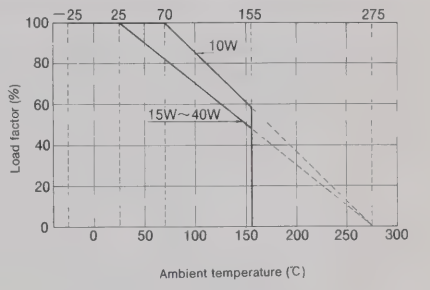
MCS

Screw-fastening terminal type

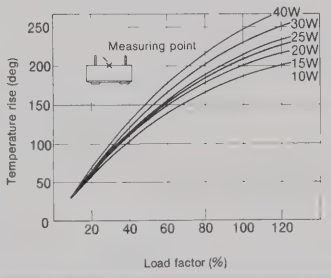


Rated power(W)	L1	L2	L3	W1	W2	H1	H2	H3	H4	(E)	G1	Resistance range(Ω)
10W	48±1.5	25±1	4.5	9.5±1	6.5	9.5±1	$17.5^{+1.5}_{-1}$	8+2	0.8	43	$1.5^{+1.5}_{-0.5}$	10mΩ－1.5kΩ
15W	48±1.5	25±1	7	12.5±1.2	7	12.5±1.2	21.5^{+2}_{-1}	9+2	1	42	$2^{+1.5}_{-0.5}$	10mΩ－2kΩ
20W	63.5±2	25±1	7	12.5±1.2	7	12.5±1.2	21.5^{+2}_{-1}	9+2	1	57.5	$2^{+1.5}_{-0.5}$	10mΩ－3kΩ
25W	63.5±2	25±1	8	16±1.2	7.5	16±1.2	$28^{+2.5}_{-1.5}$	12+2	1	56.5	$2.5^{+1.5}_{-0.5}$	10mΩ－3.6kΩ
30W	75±2.5	40±1.2	10	19±1.5	7.5	19±1.5	$29^{+2.5}_{-1.5}$	10+2	1	66	3.5^{+2}_{-1}	10mΩ－4.3kΩ
40W	90±2.5	40±1.2	10	19±1.5	7.5	19±1.5	$29^{+2.5}_{-1.5}$	10+2	1	81	3.5^{+2}_{-1}	10mΩ－5.6kΩ

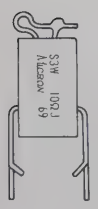
Derating curve



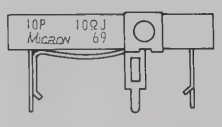
Temperature rise (ref.)



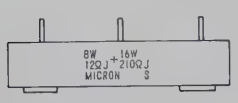
A wide application range is one of the features of cement resistors. MICRON's resistors are arranged in many ways to obtain a variety of advantages to meet the requirements of users. Some typical examples are given below. In addition to such apparent arrangements, we can accept orders for items of non-inductive (AP-windings), solvent-proof, ultra-low-resistance (as low as 0,001 available) types and resistance deviating from the specified range together with combinations of these specifications.



MT (with thermal fuse at the top)

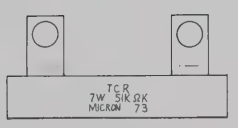


MM (with thermal fuse at the bottom)

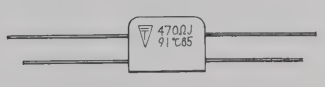


HH (with mid-terminal)

MV (high stand)



TCR (For capacitor discharge)



RTM (Temperature fuse with heater)

FRN
FRW

Fusing Resistors

※For more detailed specifications, refer to MDS-30119 for general use.

■ Type descriptions

1 2	3	4 5	6	7 8 9	10	11
F R	N	0 2	N	2 R 2	J	U
Fusing resistor	Element	Rated power	Mounting metal fitting	Nominal resistance	Tolerance for resistance	UL

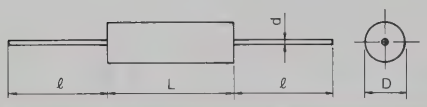
Element
N : Metal oxide film typeW
W : Wire-wound type

Rated power
14 - 1/4W
12 - 1/2W
02 - 2W
10 - 10W

Mounting metal fitting
N - Nil

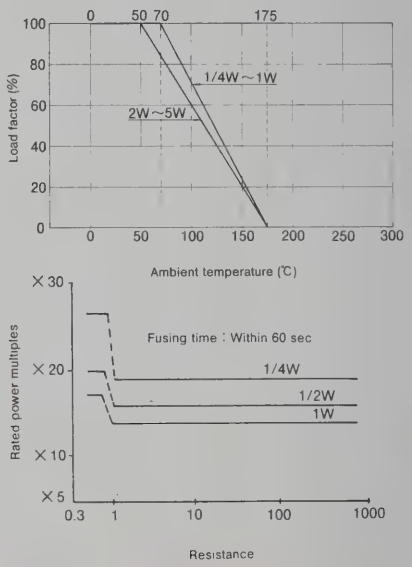
Nominal resistance
The first two digits are for an effective value and the third digit denotes the number of zeros following the former. The decimal point is indicated by "R."

Tolerance for resistance
J : ±5%
K : ±10%



Type	Rated power (W)	Dimensions (mm) D±0.5	L±1	dϕ	ℓ±3	Resistance range	Weight
FRW	1	6	20	0.8	35	0.22～ 150	1.3
	2	6	25	0.8	35	0.27～ 220	2.1
	3	8	30	0.8	35	0.47～ 270	4.0
	5	9	35	0.8	35	1.0 ～ 470	5.1
	10	11	56	1.0	35	1.8 ～1200	10.0
FRN	1/4	3.5	9	0.6	30	0.47～1000	0.4
	1/2	4.5	11	0.6	30	0.47～1000	0.6
	1	5.5	13	0.8	35	0.47～1000	1.0
	2	7.3	18	0.8	35	0.47～1000	2.2
	3	10.2	28	0.8	35	0.47～2200	6.0
	5	10.2	44	0.8	35	0.47～2200	11.0

Derating curve (ref.)



■ Fusing Resistors

MDS-30124
MDS-30125

File No. E56291

Series Name	Rated wattage (W)	Specification Type No.	Watts (W)	Volts (V)	Resistance Range (Ω)
★★★	1	FA 1	1	300	0.22～ 150
	2	//	2	//	0.27～ 220
FRW A ★★★	3	//	3	//	0.47～ 270
	5	//	5	//	1.0 ～ 470
★★★	10	//	10	//	1.8 ～1200
FRW B	2	FB 1	2	300	2.0 ～ 30
★★★★	1/4	FN 1	1/4	300	0.47～1000
	1/2	//	1/2	//	0.47～1000
FRN B	1	//	1	//	0.47～1800
	2	//	2	//	0.47～1800
	3	//	3	//	0.47～2200
	5	//	5	//	0.47～2200

The temperature limited resistors and fusing resistors have sufficient characteristics to function as fail-safe resistors. In particular, there are temperarure limited resistors and fusing resistors authorized by the UL, bearing the mark . Their fundamental constructions and shapes are equivalent to those of standard products, except for the special arrangements to meet the requirements of UL1412. Since naming and resistance range are different from those of standard products, these should be carefully specified for ordering.

F N 1	1	1 0 0	J
Type	Rated power	Nominal resistance	Tolerance

Type
FNI -
FAI -

Rated power
9-1/4W
0-1/2W
1-1W
2-2W
3-3W
5-5W
8-10W

Nominal resistance
The first two digits are for an effective value and the third digit denotes the number of zeros following the former. The decimal point is indicated by "R."

Tolerance
J : 5%
K : 10%

★★★The fusing resistors with the type No. FA1 for 2 watts (110～220ohms), 3 watts (135～270 ohms), and 10 watts (600～1,200 ohms) should be separated by 3/16 inches (4.8mm) from the mounting surface. There should also be a distance of 5/32 inches (4mm) between the resistor and the non-insulated part of the opposite-polarity body or the non-insulated dead metallic section.
★★★★The fusing resistors with the type No. FN (1/4 watts for all resistances and tolerance ranges) should be checked by adequate limited short-circuit testing in the completed equipment.

MEG
MES
MER

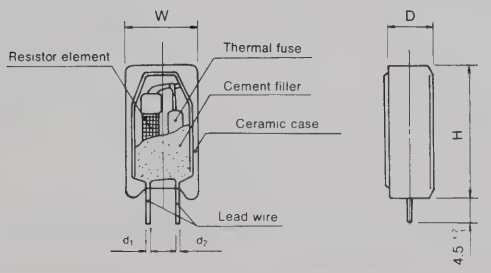
Thermal fuse incorporated cement resistors

Since thermal fuses are incorporated, cement resistors respond quickly to overloading as well as external overheating.

These resistors also provide outstanding features against surges. Therefore they are suitable for the prevention of inrush current for switching regulators.

■ Type descriptions

M E	G	0 5	N	1 0 0	J	U	1 3 5
Thermal fuse incorporated cement resistor	Element G - wire-wound type (ceramic core) S - Wire-wound type (glass fiber core) R - Metal oxide film	Type	Mounting metal fitting N - Nil	Nominal resistance	Tolerance for resistance J : ±5% K : ±10%	Spec. : U=UL Spec. (Standard)	Norminal operating temperature 135℃ (Standard)

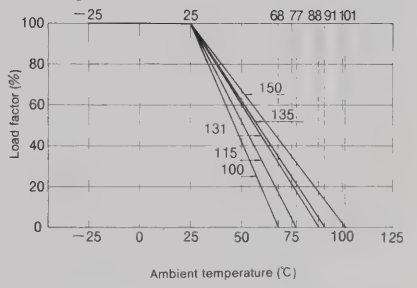


Type	Dimensions (mm)					Temperature range of each element		
	W	D	H	d_1	d_2	MEG	MES	MER
02	11±1	7±1	20.5±1.5	0.8±0.1	0.6±0.1	4.7～20	0.15～ 200	100～13K
03	12±1	8±1	25.0±1.5	0.8±0.1	0.6±0.1	4.7～20	0.27～ 360	100～22K
05	13±1	9±1	25.5±1.5	0.8±0.1	0.6±0.1	4.7～91	0.3 ～ 510	100～27K
07	13±1	9±1	38.5±1.5	1.0±0.1	1.0±0.1	——	0.51～1500	——

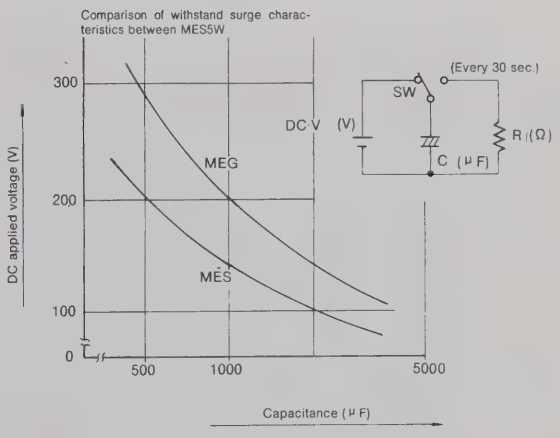
Rated power, resistance range, tolerance, etc.

Type	Resistance range	Tolerance	Type of thermal fuse		Continuous Rated power
			Nominal operating temp	Operating temp	
02	0.15Ω～13kΩ	J:±5% K:±10%	100	$95\pm\frac{6}{2}$	0.7W
			115	110±4	1.0W
			131	126±4	1.4W
			135	130±4	1.5W
			150	145±4	1.9W
03	0.27Ω～22kΩ		100	$95\pm\frac{6}{2}$	0.75W
			115	110±4	1.05W
			131	126±4	1.45W
			135	130±4	1.55W
			150	145±4	2.0W
05	0.3Ω～27kΩ		100	$95\pm\frac{6}{2}$	0.8W
			115	110±4	1.1W
			131	126±4	1.5W
			135	130±4	1.6W
			150	145±4	2.1W
07	0.51Ω～1.5kΩ		101	$99\pm\frac{2}{6}$	1.3W
			113	$109\pm\frac{6}{2}$	1.6W
			121	119±4	1.9W
			133	129±4	2.2W
			147	139±4	2.7W

Derating curve



Withstand surge characteristics



★ Standard product

MEG 05N, ±5%, 135℃
Resistance: E6, E12 Series

In addition to the 10A fuses, special items can also be designed and manufactured.

MEG and MES 5W series have approved by UL.

MBP
MBC
MBS
MBR

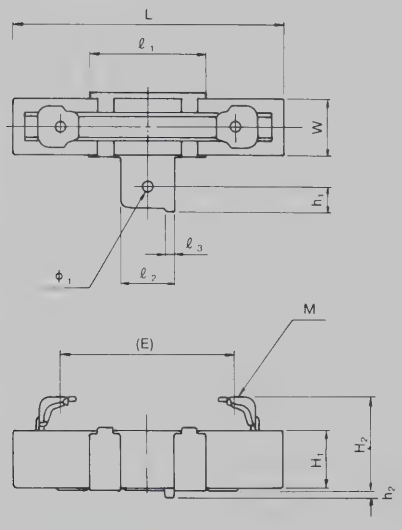
Screw-fastening terminal types (for high forque)

Making the best use of the fail-safe feature offered by cement resistors, this type has been developed for use in industrial equipment and general applications. This type of resistor is provided with M4 (M5) screw-fastening terminals. A pneumatic screwdriver is available for fastening.

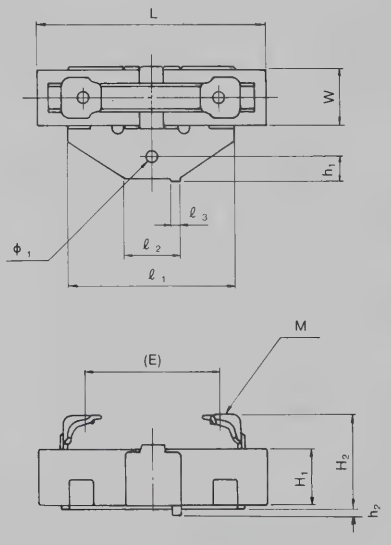
■ Type descriptions

1 2	3	4 5	6	7 8 9	10	11
M B	S	4 0	A	1 0 0	K	I
Generic name	Resistor element	External shape	Mounting metal fittings	Resistance	Tolerance	Distinction of inductive/non- inductive

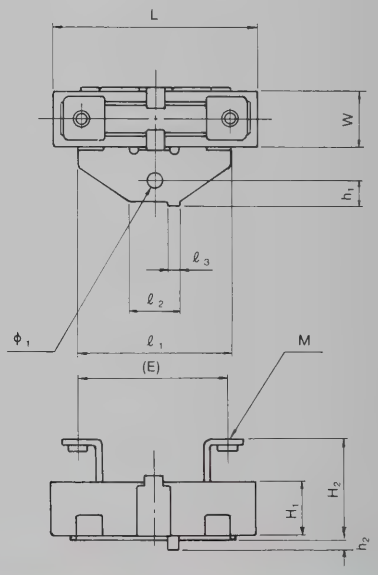
● MB40



● MB30



● MB20, MB15

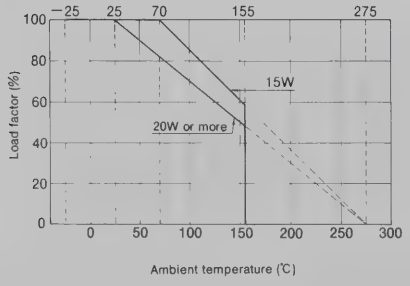


External dimensions

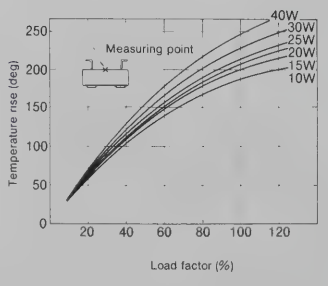
(mm)

Shape	L	W	H_1	H_2	(E)	M	ℓ_1	ℓ_2	ℓ_3	ϕ_1	h_1	h_2	Holder plate thickness
MB40	90±2.5	19 ±1.5	19 ±1.5	31^{+3}_{-1}	58	M5×P0.8	39	18	3	4.2	8	2.2	0.8
MB30	75±2.5	19 ±1.5	19 ±1.5	31^{+3}_{-1}	44	M5×P0.8	55	18	3	4.2	8	2.2	1.0
MB20	63.5±2	12.5±1.2	12.5±1.2	23.5^{+2}_{-1}	50	M4×P0.7	36	12	3	4	6	2.2	1.0
MB15	48±1.5	12.5±1.2	12.5±1.2	23.5^{+2}_{-1}	35	M4×P0.7	36	12	3	4	6	2.2	1.0

Derating curve



Temperature rise (ref.)



Nominal resistance values

Shape	Element construction	Inductive/ Non-inductive	Rated power	Nominal resistance range	Tolerance	
					Symbol	Tolerance
MB15	P(band wire)	I		—	J	±5%
		N	15W	15mΩ～160mΩ		
	C(Coil)	I	15W	0.14Ω～0.9Ω		
		N	15W	0.14Ω～0.9Ω		
	S(Wire wound)	I	9W	0.7Ω～1.2kΩ		
		N	11W	0.6Ω～120Ω		
	R(metal oxide film)	I	5W	100Ω～27kΩ		
		N				
MB20	P(band wire)	I		—		
		N	20W	5.5mΩ～200mΩ		
	C(Coil)	I	20W	0.19Ω～1.3Ω		
		N	20W	0.19Ω～1.3Ω		
	S(Wire wound)	I	15W	0.8Ω～2kΩ		
		N	15W	0.8Ω～220Ω		
	R(metal oxide film)	I	7W	220Ω～55kΩ		
		N	-	-	K	±10%
MB30	P(band wire)	I				
		N	30W	5mΩ～160mΩ		
	C(Coil)	I	30W	0.16Ω～1.8Ω		
		N	30W	0.16Ω～1.8Ω		
	S(Wire wound)	I	24W	1.2Ω～3.3kΩ		
		N	24W	0.8Ω～330Ω		
	R(metal oxide film)	I	15W	500Ω～110kΩ		
		N		—		
MB40	P(band wire)	I				
		N	40W	5mΩ～0.35Ω		
	C(Coil)	I	40W	0.2Ω～2.6Ω		
		N	40W	0.2Ω～2.6Ω		
	S(Wire wound)	I	32W	1.5Ω～5kΩ		
		N	32W	1.3Ω～470Ω		
	R(metal oxide film)	I	20W	500Ω～180kΩ		
		N	—	-		

MYP
MYC
MYS

Large-capacity type resistors with aluminium diecast case

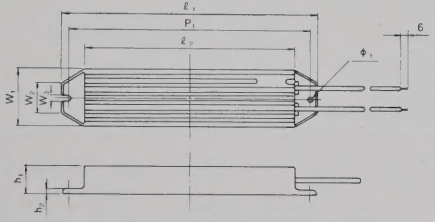
※Please refer to MDS-70507 for more detailed information.

■ Type descriptions

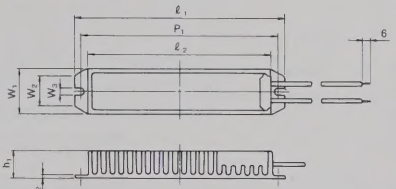
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
M	Y	C	2	2	N	3	3	0	K	I	X	3	0	0	W	Z	Z

- 1 2: Generic name
- 3: Resistor element
- 4 5: External shape
- 6: Standard
- 7 8 9: Resistance
- 10: Tolerance
- 11: Distinction of inductive/non- inductive
- 12: Lead pull out method
- 13 14 15: Lead length in mm
- 16: Withstand voltage — W: AC 2500V, B: AC 3000V
- 17 18: Specification for thermal devices ZZ: None

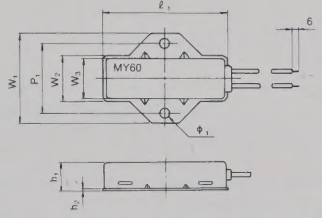
● MY22, MY12



● MY08



● MY06



※Terminal arrangements should be separately specified.

Lead wire conductor cross-section;

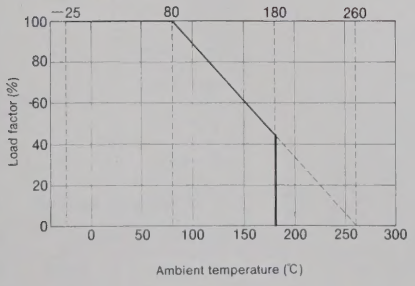
Withstand voltage \ Conductor cross-sectional area	1.25mm²	2mm²	5.5mm²
2000V	○	—	—
2500V	—	○	—
3000V	—	○	○

External dimensions

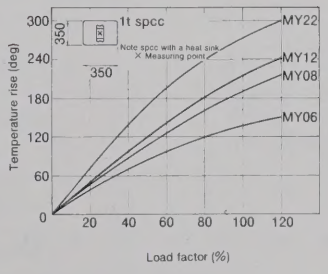
(mm)

Shape	ℓ_1	ℓ_2	P_1	W_1	W_2	W_3	h_1	h_2	ϕ_1
MY22	230±1.5	200±1	220±1	60±0.8	42.7±0.8	$4.3^{+0.4}_{0}$	20±0.8	3.5±0.5	$4.3^{+0.4}_{0}$
MY12	182±1.5	150±1	172±1	42±0.8	23.5±0.8	$4.3^{+0.4}_{0}$	20±0.8	3.5±0.5	$4.3^{+0.4}_{0}$
MY08	150	130	140±0.5	34	20	$4.5^{+0.5}_{-0.2}$	20	$2.5^{+0.5}_{-0.3}$	—
MY06	90±1	—	50±0.5	64±0.6	34±0.6	32±0.5	20±0.6	1.2	7±0.3

Derating curve



Temperature rise (ref.)



Nominal resistance values

Shape	Element construction	Inductive/ non-inductive	Rated power	Nominal resistance range	Tolerance	
					Symbol	Tolerance
MY06	P(band wire)	N	60W	0.06Ω～0.25Ω	J	±5%
	C(Coil)	N		0.125Ω～8.25Ω		
		I		0.25Ω～16.5Ω		
	S(Wire wound)	N		8.25Ω～660Ω		
		I		16.5Ω～5.4kΩ		
MY08	P(band wire)	N	80W	0.165Ω～1Ω		
	C(Coil)	N		1Ω～58Ω		
		I		1Ω～100Ω		
	S(Wire wound)	N		3.2Ω～386Ω		
		I		38.6Ω～4.6kΩ		
MY12	P(band wire)	N	120W	0.1Ω～0.5Ω	K	±10%
	C(Coil)	N		0.25Ω～10Ω		
		I		0.5Ω～33Ω		
	S(Wire wound)	N		10Ω～1.4kΩ		
		I		33Ω～13.6kΩ		
MY22	P(band wire)	N	220W	0.1Ω～1Ω		
	C(Coil)	N		0.5Ω～8Ω		
		I		1Ω～50Ω		
	S(Wire wound)	N		8Ω～2.2kΩ		
		I		50Ω～21.1kΩ		

High-surge-resistant items are also available.

Items with the thermal switches are also available.

MRP
MRC
MRS

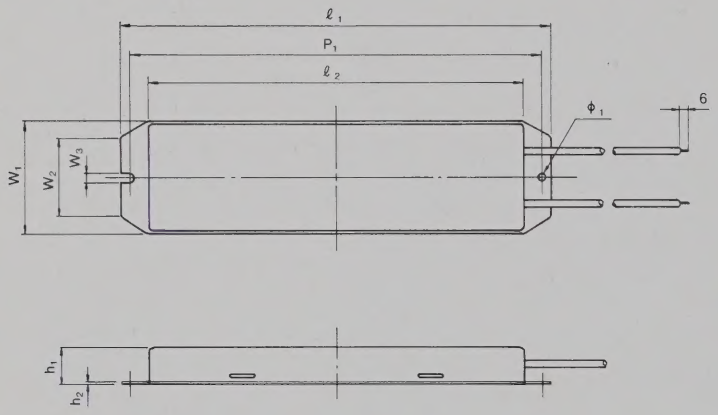
Large-capacity type resistors with aluminum case (Economy type)

※Please refer to MDS-1212 for more detailed information.

■ Type descriptions

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
M	R	C	0	8	N	I	R	0	K	I	X	2	2	0	C	Z	Z

- 1 2: Generic name
- 3: Resistor element
- 4 5: External shape
- 6: Standard
- 7 8 9: Resistance
- 10: Tolerance
- 11: Distinction of inductive/non- inductive
- 12: Lead pull out method
- 13 14 15: Lead length in mm
- 16: Withstand voltage — AC 2000V



※Terminal arrangements should be separately specified.

External dimensions

(mm)

Shape	ℓ1	ℓ2	P1	W1	W2	W3	h1	h2	φ1
MR08	132	100	122±0.4	44±0.4	26	$4.3^{+0.3}_{0}$	20	1	4.3
MR12	182	150	172±0.9	42±0.4	23.5	$4.3^{+0.3}_{0}$	20	1.2	4.3
MR22	230	200	220±0.4	60±0.4	42.7	$4.3^{+0.3}_{0}$	20	1.2	4.3

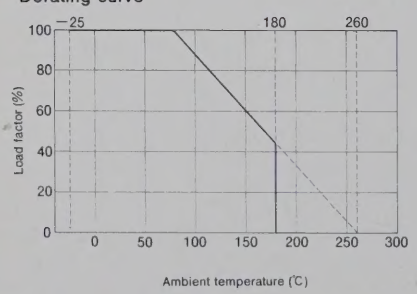
Lead wire conductor cross-section;

Withstand voltage \ Conductor cross-sectional area	0.75mm²	3.5mm²
2000V	○	○

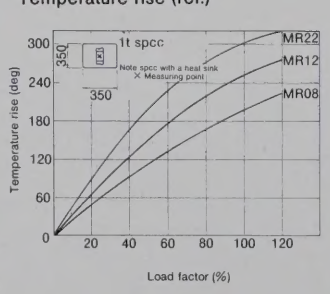
Nominal resistance values

Shape	Element construction	Inductive/ non-inductive	Rated power	Nominal resistance range	Tolerance	
					Symbol	Tolerance
MR08	P(band wire)	N	80W	0.08Ω～0.4Ω	J	±5%
	C(Coil)	I		0.4Ω～8.8Ω		
		N		0.24Ω～2.8Ω		
	S(Wire wound)	I		8.8Ω～4.8kΩ		
		N		2.8Ω～660Ω		
MR12	P(band wire)	N	120W	0.1Ω～0.5Ω		
	C(Coil)	I		0.5Ω～50Ω		
		N		0.25Ω～10Ω		
	S(Wire wound)	I		50Ω～13.6kΩ		
		N		10Ω～1.4kΩ	K	±10%
MR22	P(band wire)	N	220W	0.2Ω～1Ω		
	C(Coil)	I		1Ω～65Ω		
		N		0.5Ω～8Ω		
	S(Wire wound)	I		65Ω～21.1kΩ		
		N		8Ω～2.2kΩ		

Derating curve



Temperature rise (ref.)



MLP
MLC
MLS

Large-capacity types with aluminum heat-dissipation fins

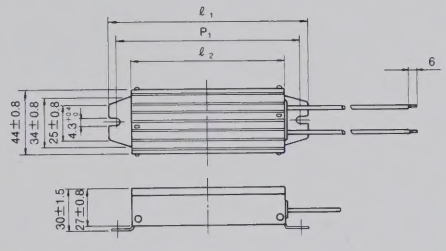
※Please refer to MDS-70506 for more detailed information.

■ Type descriptions

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
M	L	C	3	0	F	3	3	0	K	I	X	3	0	0	W	Z	Z

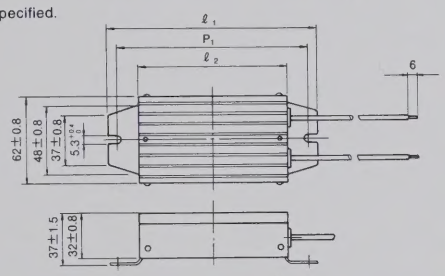
- 1 2: Generic name
- 3: Resistor element
- 4 5: External shape
- 6: Capacity type
- 7 8 9: Resistance
- 10: Tolerance
- 11: Distinction of inductive/non-inductive
- 12: Lead pull out method
- 13 14 15: Lead length in mm
- 16: Withstand voltage
- 17 18: Specification for thermal devices ZZ: None

Capacity type : Type L



※Terminal arrangements should be separately specified.

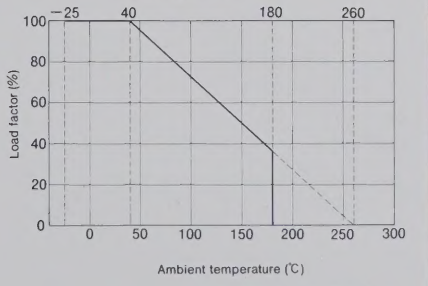
Capacity type : Type F



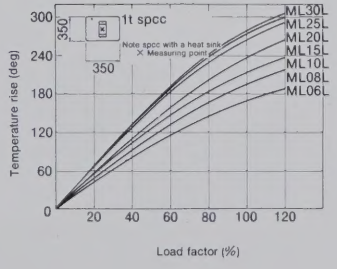
Lead wire conductor cross-section;

Withstand voltage \ Conductor cross-sectional area	2mm²	3.5mm²	5.5mm²
2500V	○	—	—
3000V	○	—	○
3500V	—	○	—

Derating curve



Temperature rise (ref.)



External dimensions (mm)

Shape	ℓ1±2	ℓ2±2	P1±2
ML06L	112	80	102
ML08L	132	100	122
ML10L	152	120	142
ML12L	212	180	202
ML20L	282	250	272
ML25L	347	315	337
ML30L	412	380	402
ML15F	162	120	150
ML20F	212	170	200
ML25F	262	220	250
ML30F	312	270	300

Nominal resistance values

Shape	Element construction	Inductive/ non-inductive	Rated power	Nominal resistance range	Tolerance Symbol	Tolerance
ML06L	P(band wire)	N	60W	0.06Ω～0.25Ω	J	±5%
	C(Coil)	N	60W	0.16Ω～1.9Ω		
		I		0.25Ω～6Ω		
	S(Wire wound)	N	24W	1.9Ω～360Ω		
		I		6Ω～2.4kΩ		
ML08L	P(band wire)	N	80W	0.08Ω～0.4Ω		
	C(Coil)	N	80W	0.24Ω～2.8Ω		
		I		0.4Ω～8.8Ω		
	S(Wire wound)	N	48W	2.8Ω～660Ω		
		I		8.8Ω～4.8kΩ		
ML10L	P(band wire)	N	100W	0.1Ω～0.56Ω		
	C(Coil)	N	100W	0.32Ω～37		
		I		0.56Ω～11.7Ω		
	S(Wire wound)	N	66W	3.7Ω～940Ω		
		I		11.7Ω～7.2kΩ		
ML15L	P(band wire)	N	150W	0.15Ω～1Ω		
	C(Coil)	N	150W	0.55Ω～6.6Ω		
		I		1Ω～20Ω		
	S(Wire wound)	N	142W	6.6Ω～2kΩ		
		I		20Ω～14.4kΩ		
ML20L	P(band wire)	N	200W	0.2Ω～1.5Ω		
	C(Coil)	N	200W	0.84Ω～10Ω		
		I		1.5Ω～36Ω		
	S(Wire wound)	N	200W	10Ω～3kΩ		
		I		36Ω～22.8kΩ		
ML25L	P(band wire)	N	250W	0.25Ω～2Ω		
	C(Coil)	N	250W	1.1Ω～14Ω	K	±10%
		I		2Ω～44Ω		
	S(Wire wound)	N	250W	14Ω～4.4kΩ		
		I		44Ω～30.6kΩ		
ML30L	P(band wire)	N	300W	0.3Ω～2.5Ω		
	C(Coil)	N	300W	1.36Ω～18Ω		
		I		2.5Ω～54Ω		
	S(Wire wound)	N	300W	18Ω～5.4kΩ		
		I		54Ω～38.4kΩ		
ML15F	P(band wire)	N	150W	0.15Ω～0.6Ω		
	C(Coil)	N	150W	0.53Ω～6.2Ω		
		I		0.6Ω～19.5Ω		
	S(Wire wound)	N	92W	6.2Ω～1.3kΩ		
		I		19.5Ω～10.8kΩ		
ML20F	P(band wire)	N	200W	0.2Ω～0.93Ω		
	C(Coil)	N	200W	0.91Ω～10.8Ω		
		I		0.93Ω～33Ω		
	S(Wire wound)	N	200W	10.8Ω～2.8kΩ		
		I		33Ω～24.3kΩ		
ML25F	P(band wire)	N	250W	0.25Ω～1.7Ω		
	C(Coil)	N	250W	1.34Ω～16Ω		
		I		1.7Ω～49Ω		
	S(Wire wound)	N	250W	16Ω～4.8kΩ		
		I		49Ω～37.8kΩ		
ML30F	P(band wire)	N	300W	0.3Ω～2.3Ω		
	C(Coil)	N	300W	1.73Ω～20Ω		
		I		2.3Ω～68Ω		
	S(Wire wound)	N	300W	20Ω～6kΩ		
		I		68Ω～51.3kΩ		

MOS

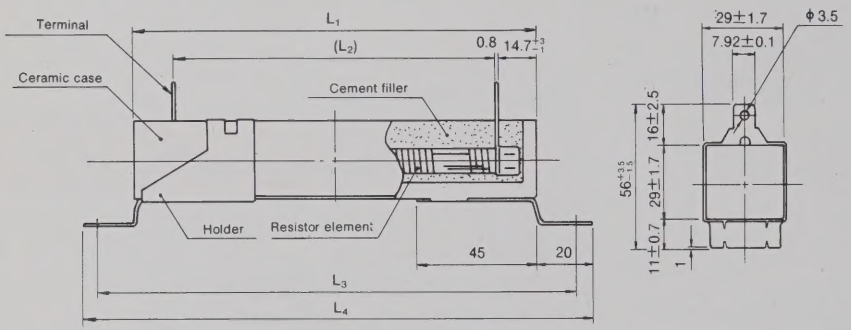
Large-capacity cement resistors in ceramic case

This is a series of large-capacity cement resistors contained in non-metallic cases. Since these resistors can be arranged into modules, conventional resistors of the same classes (large-capacity paint resistors, enameled resistors) can be immediately replaced with them. They are economically advantageous.

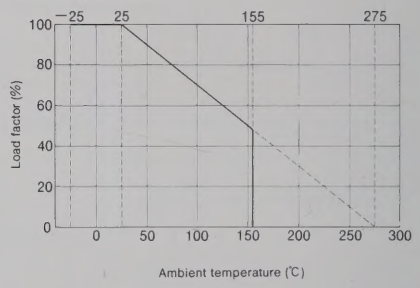
■ Type descriptions

M O S	0 6	A	1 0 1	K	I
Generic name	External shape	Mounting fittings A : horizontal B : vertical	Nominal resistance	Tolerance	Distinction of inductive/ non-inductive

External appearance and construction



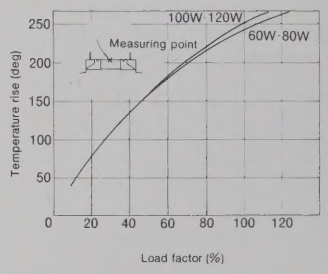
Derating curve



Rated power, size, and resistance range

Shape	Rated power	Dimensions (mm) L1	(L2)	L3	L4	Nominal resistance range	Tolerance
MO06	60W	100±2.5	69	110～130	140±4	2.4Ω～9.1kΩ	J : ±5% K : ±10%
MO08	80W	125±2.5	94	135～155	165±4	3.3Ω～13kΩ	
MO10	100W	150±3	119	160～180	190±5	4.3Ω～16kΩ	
MO12	120W	175±3	144	185～205	215±5	5.0Ω～20kΩ	

Temperature rise (ref.)



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